DEVELOPMENT OF MATHEMATICAL COMPETENCIES OF FUTURE PRIMARY SCHOOL TEACHERS IN THE PROCESS EXPECTED RESULTS FROM IMPLEMENTATION OF THE CONCEPT

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https://doi.org/10.5281/zenodo.11395369

Abstract. *Mathematical practice standards are inextricably linked to the content standards at each grade level and are reflected in the corresponding content standards. The norms of practice correspond to the content of the norms of maintenance and are instilled taking into account the physiological capabilities of the corresponding age and sphere of mental activity.*

When organizing mathematics lessons, it is necessary to pay more attention to practice than theory and to some extent abandon the approach based on providing students with ready-made educational materials. In mathematics lessons, it is recommended to use more interactive methods, such as cases, studies, projects, and small educational discoveries. When developing small research skills in students, it is necessary to use such methods of scientific research as observation, experiment, measurements, analysis and synthesis, induction and deduction, comparison and analogy. It is important not only to develop knowledge and skills in students, but also to acquire competencies for applying them in life situations.

Keywords: *concept, mathematics, competence, national curriculum, learning, education, education, primary school.*

Democratic changes in Uzbekistan society have led to serious changes in the primary school education system, which affected both the organizational and content aspects of these levels of education.

Significant changes have occurred in the content of education for children of primary school age, in the general nature and style of the pedagogical process: the variability of programs, curricula, and teaching aids is becoming increasingly widespread, which significantly enriches the content of the initial stage of education. An analysis of the situation shows that this trend should remain a characteristic feature of the education system in the future. At the same time, the changes taking place in the education system have shown the unpreparedness of a significant part of the teaching staff to make a conscious choice of a variable educational program and its adequate implementation, taking into account opportunities and needs[3].

By implementing the tasks defined within the concept, it is planned to achieve the following indicators:

Educated, experienced and modern thinking high-potential, competitive, competent personnel are being prepared;

The concept is the basis of the requirements established in the state educational standards of general secondary education;

Broad implementation of the goals and objectives defined in the concept effectively influences the intellectual development of students;

The stages of teaching mathematics, the educational content of the subject, and the standards of requirements for knowledge, skills and competencies of students have been determined;

By introducing STEAM education, it improves the literacy level of its students through subject integration;

a system of gradually increasing the weight of electronic resources in the educational process, creating electronic educational literature and collections and placing them on a unified information educational platform;

in accordance with the basic curriculum, educational programs are developed taking into account the volume of mathematical subjects by grade and topic, updated content, sequence of training, acquired knowledge, skills and competencies;

a new assessment system will be developed taking into account the content, characteristics of mathematics and the requirements of state educational standards, and on its basis a national system for certifying the level of knowledge in mathematics will be introduced;

a base of practical tasks will be created that meets the requirements of international assessment programs (PISA, TIMSS), aimed at developing mathematical literacy, logical thinking and practical skills of students, and the appropriate participation of students of our country in these international assessment programs will be ensured;

New generation educational and methodological complexes (textbook, teacher's manual, electronic textbooks) have been developed and introduced into the educational process in the mathematics section;

innovative methods of using modern pedagogical technologies in teaching mathematics are being created;

STEAM is focused on interdisciplinary connections and a practical approach to teaching students on an international scale, based on the demands of the time;

student educational projects and educational and research work are developed;

Career guidance work is organized for students through mutual integration with the subjects of general secondary education;

knowledge and skills of mathematics teachers for the purpose of continuous professional development, a personal and professional information space for the teacher will be created and the education system will be radically updated based on modern digital technologies;

Digital technologies will be introduced into the educational process, a unified virtual environment will be launched - an information educational platform, including an electronic library in the field of mathematics, all electronic resources related to educational and methodological support for classes. video tutorials, virtual laboratory, multimedia interactive animation applications are posted[5].

Schools will be equipped with modern classrooms and laboratories, new types of educational furniture, equipment and tools, visual aids, computer equipment and other technical teaching aids, and within the framework of the state program “Modern School”, secondary schools will be equipped to gradually introduce a network of SMART classes, classrooms and workshops , designed for STEAM learning.

Recommendations for developing basic competencies in students through mathematics.

In the general secondary education system, it is determined that basic competencies are formed in students along with subject competencies. It is advisable to focus on the formation of

students' basic competencies through the subjects of a block of specific subjects, to be able to apply the acquired skills and qualifications based on the acquired knowledge in various situations.

In particular, when developing communicative competencies, it is necessary to teach the state language, foreign languages, independent, creative thinking, fluent written and oral presentation, correct pronunciation, interpretation, and free communication. In particular, the science of mathematics has its own scientific language, its own concepts, signs and symbols, and communication in this language should be considered as a factor in the formation of communicative competencies.

When teaching science, it is necessary to regularly use modern information and telecommunications tools that expand the possibilities for the effective development of competence in working with information. Thus, students learn to work with textbooks and various educational resources, search and analyze information related to mathematics from various sources, and also develop skills in working with information media in compliance with information security requirements, using various practical software packages and consumables, it is recommended use mobile devices (phone, tablet and other gadgets).

When forming self-development competence, it is necessary to acquire qualities based on universal human values, love the Motherland, have knowledge about society and nature, strive for innovation and make independent decisions based on acquired theoretical knowledge. it is necessary to be aware of and take into account progressive and innovative changes, to always strive to acquire modern knowledge and skills, and learn to use them in everyday life. Here, by carefully studying mathematics, students get used to the discipline, look at each problem as a mathematical problem, and become persistent in solving it.

In developing socio-emotional and civic competence, it is necessary to acquire knowledge about civic duty, socio-political development, emergency situations, environmental issues, as well as understand artistic works and develop organizational skills in their preservation. Mathematics also instills in them a spirit of honesty, indifference to injustice and loyalty to the Motherland. The rigorous teaching of mathematics provides the foundation for students to develop as active citizens of society[6].

Mathematics-related competencies. System of national educational standards "Al-Jabr". The approach to creating national educational standards in mathematics is systematic, i.e. embedded in a specific system, and it is called "Al-Jabr". This name has a special meaning of "recovery"[8].

The standards cover all students as widely as possible from the beginning of education and ensure the opportunity for their full participation in the learning process, and the maximum participation of students with special educational needs should create appropriate conditions. The standards set clear benchmarks that all students must meet to prepare for further education and employment. More precisely, standards should define what students understand and can do.

Educational standards in mathematics consist of generalized requirements for the knowledge, skills and competencies of graduates of secondary general education institutions (grade 11) in mathematics, which include mathematical content and mathematical norms, divided into practice standards.

The methodological literature has not yet formulated general scientifically based criteria for the quantitative and qualitative selection of tasks, their logical sequence of distribution for each topic. Therefore, a mathematics teacher needs such a selection of tasks for a particular topic, chapter, and entire course.

It should be noted that the selected system of tasks must satisfy certain methodological requirements:

1. A clear definition of the didactic goal of the entire system of tasks and each task separately.

2. Sequence of complication.

3. The system must cover all types of problems (calculation, construction, proof and research). This helps to find different ways to solve the same problem, and also provides rich material and great opportunities for problems and their solutions.

These standards define what students are expected to understand and be able to do when learning mathematics. One of the hallmarks of mathematical understanding is the student's ability to justify whether a particular mathematical expression is true or false, or where a particular mathematical rule comes from, depending on the student's level of mathematical proficiency. Equally important is an understanding of mathematical concepts and the ability to perform standard operations, which are assessed using standard tasks of a certain level of complexity[10].

Mathematical content standards are expressed in the form of generalized requirements; they cover the following sections of mathematics (for ease of use in the future, section names are coded with two capital letters):

- Numbers and operations ;
- Algebra and functions :
- Geometry and measurements ;
- Statistics and probability ;
- Fundamentals of mathematical analysis

Numbers and Operations:

1. Have an idea of numbers and quantities (quantities),
know the methods of their description and counting systems,
2. Establish connections between numbers and sizes and
understanding and use in solving word problems;
3.Know the essence of mathematical operations and between them.
understanding relationships;
4. Easily perform calculations of numbers and quantities, evaluate and evaluate results.

Algebra and Functions :

1. Laws and relationships in nature and society
understanding;
2. Live using functions and algebraic symbols and symbols.

express and analyze situations and phenomena in nature in mathematical language, interpret the relationships between variables in these processes from a mathematical point of view;

3. Understanding quantitative relationships, creating their mathematical model and using it;

4. Be able to use standard methods for solving linear, quadratic, rational, irrational, exponential, logarithmic, power and trigonometric equations, inequalities and their systems, as well as visually represent the solutions;

5. Know the basic concepts, formulas, ideas and methods of algebra and use them to solve problems.

Geometry and Measurements :

1. Basic concepts about flat and spatial geometric figures, be able to use their basic properties when solving problems of practical content, be able to recognize drawings, models and geometric figures in the real world;

2. Development of mathematical and logical thinking about geometric relationships;

3. Image of spatial relationships in the coordinate system and other image systems and determination of their geometric position, performing simple geometric constructions;

4. Use of symmetry and substitutions of geometric figures in the analysis of mathematical situations;

5. Using proof methods and algorithms for solving problems, making sound mathematical judgments in the process of solving problems;

6. Using methods of geometric modeling, spatial observation and visualization when solving problems;

7. Know the measured elements of various objects, units of measurement, understand the essence of measuring systems and processes;

8. Use of appropriate measurement methods, formulas, educational tools, multimedia interactive applications, calculators and measuring instruments in the measurement process.

Statistics and Probability [11].

1. Search, identification, collection and processing of necessary information.

providing and interpreting results and presenting them using a variety of tools;

2. Selecting and applying appropriate statistical methods for data analysis;

3. Make appropriate conclusions and predictions based on the data and evaluate them;

4. Has an understanding of random, statistical events and processes, study them, develop probabilistic models, interpret them, evaluate and use them.

Fundamentals of mathematical analysis :

1. Function, domain of definition of the function, set of values.

know concepts, types of functions: increasing and decreasing, even and odd, periodic, inverse and complex functions, general properties of functions: zeros, increasing and decreasing intervals, positive and negative intervals, greatest and least values, know the period, concepts and be able to define them in simple cases;

2. Know the essence of the concepts of continuity and derivative of a function, understand the geometric and physical meaning of the derivative, know the algorithm for checking a function using the derivative and be able to use it. determine the properties of functions, as well as solve practical, extreme problems;

3. Be able to recognize power, rational, irrational, exponential (exponential), logarithmic, trigonometric, inverse trigonometric functions and know their basic properties and use them in solving equations and inequalities, their systems, as well as in solving practical problems. Problems;

4. Know the essence of elementary functions and certain integral concepts and be able to use them in solving various practical problems (calculating areas and volumes, finding the work done) [13].

The ability to apply acquired knowledge and skills when solving practical problems and in unfamiliar situations (competencies).

These standards also consist of practical implementation standards with generalized content, which cover the following areas of students' mental activity (for ease of use in the future, the areas of mental activity are coded as M1, M2, M3, M4 and M5, respectively):

- Reasoning (M1); provide logical and understandable arguments to justify, prove, or respond to the opinions of others;

1. Logical inference, conjecture, inference, based on mental activity, conclusion, presentation of arguments, justification, conclusion, thinking about reasons and causes;

2. Reflection on the definitions, rules, concepts, algorithms and methods used, mathematical solutions and errors;

3. Recognizing connections between mathematical concepts and their use;

4. Combining mathematical concepts or building one on top of another to form a complete mathematical concept.

- Modeling (M2): expression of educational and life problems in the language of mathematics, construction of their mathematical model;

1. Read and understand the essence of problem situations, analyze and

identify the problem presented in it;

2. Explanation of events and processes in nature, society and

use of various methods of mathematical interpretation of modeling;

3. Expressing the problem in the form of a mathematical problem, creating a mathematical model.

- Problem Solving (M3): solve a problem using mathematics do;

1. Use learned mathematical concepts, facts, ideas, laws, algorithms and methods to solve life problems and practical mathematical problems;

2. Logical, creative thinking when solving a problem (issue),

methods of mathematical observation and scientific research: observation, measurement, experimentation, analysis and synthesis, induction and deduction, the use of comparisons and analogies;

3. Analysis, selection and justification of alternative methods and algorithms for solving the problem (problem);

4. Creation and development of new mathematical knowledge in the process of solving a problem;

5. Expressing and exploring mathematical assumptions, mathematical reasoning, comparison and evaluation;

6. Transfer of a mathematical solution into the content of a real problem and its interpretation in relation to the real problem described in the mathematical problem, and assessment of the compatibility and proximity of the found solution to the real solution of the problem;

7. Demonstration of algorithms for solving problems in the process of performing independent or collective small research, project work based on life situations.

- Communication skills (M4): communication in the language of mathematics, based on mathematical concepts, signs and symbols;

1. Communicate mathematical ideas orally and in writing, use mathematical language, signs and symbols to communicate with other people;

2. Understand, analyze, evaluate, and respond to others' ideas about mathematics.

- Working with data (M5): collecting, analyzing and presenting data in various forms.

1. Statement, proposal and information in different forms and representations, description, transformation from one form to another, analysis, mathematical interpretation and their use;

2. Use the language of mathematics, signs and symbols, the capabilities of computer and information and communication technologies to clearly express mathematical ideas orally, in writing and graphically;

3. Identification, collection and processing of necessary information to solve the problem;

4. Selecting and applying appropriate statistical methods for data analysis;

5. Development of appropriate conclusions and forecasts based on data and their evaluation;

6. Understanding and using the basic concepts of probability theory.

Mathematical practice standards are intrinsically linked to the content standards at each grade level and are reflected in the corresponding content standards. The norms of practice correspond to the content of the norms of maintenance and are instilled taking into account the physiological capabilities of the corresponding age and sphere of mental activity[15].

When organizing mathematics lessons, it is necessary to pay more attention to practice than theory and to some extent abandon the approach based on providing students with ready-made educational materials. In mathematics lessons, it is recommended to use more interactive methods, such as cases, studies, projects, and small educational discoveries. When developing small research skills in students, it is necessary to use such methods of scientific research as observation, experiment, measurements, analysis and synthesis, induction and deduction, comparison and analogy. It is important not only to develop knowledge and skills in students, but also to acquire competencies for applying them in life situations[18].

The content of the task should be based on the goals of teaching mathematics in secondary school. The formulation of the question in the problem should, as a rule, be realistic. Mastering the task must be specific. and the selection of the necessary data should have both educational and practical value.

It should be noted that the selected tasks as a whole and each task separately would have pedagogical value if the component of the system could answer the following questions:

1. What is the goal of this task?

2. Is there a need for this particular task, and not another?

3. Why are such and not other specific data taken in the problem?

4. How interesting is the task for students, does it arouse students' interest in the answer and method of solution? What exactly ?

Is it possible to increase this interest?

5. Will the student be able to solve this problem independently? What should he know, remember, be able to do for this?

6. To what extent should the teacher help him in case of difficulty?

7. What do we want to achieve from students in the process of solving this problem?

8. How is this task related to the student's previous and subsequent work?

When selecting a system of tasks in order to develop the creative thinking of students, it is necessary to take into account the didactic principles of teaching.

Setting tasks in the process of teaching the basics of science, the principles of their selection are solved theoretically and practically. These problems are discussed in the works of scientists, teachers and psychologists: M.I.Djumayev and others, "Problem solving as the main method of teaching, as a method for students to acquire new knowledge - this, in our opinion, is the way to solve the problem of student development." [10].The author also believes that the solution to

pedagogical issues of using tasks in teaching will not be complete without a logical and psychological analysis of the structure and types of those tasks that are used in this teaching[8].

Selecting a system of problems can be an effective means of developing students' creative thinking in the process of solving problems. if it is based on specific principles arising from the basic laws of the processes of creativity and teaching mathematics.

The description of such principles determines the structure of a given material with a general orientation towards increasing the heuristic function of geometric problems. It will talk about two principles of systematization of exercises - the principle of constantly increasing the complexity of the proposed tasks and the principle of "guiding towards discovery" [8]. These normative provisions determine the nature of development of both a given given line and the entire system as a whole.

Students are encouraged to complete only one project in a subject or area of study they are interested in per academic year. Project work topics are selected by teachers as a problem situation or case within one or more academic subjects. Students can work individually or in groups of 3-4 people depending on their interests. Work on the project ends with a defense held at the end of the academic year. The defense can be carried out in the form of a conference within one or more academic disciplines.

Individual or group work of students on the topic of project work may include the following educational activities: planning their own research activities, distributing tasks among themselves, setting educational goals for them, collecting the necessary information to search for a solution to the problem. situations related to the topic, choose the most appropriate one and justify it, if necessary, conduct surveys or experiments, prepare a report on the results of project work, analyze and evaluate your own activities, defend project work on preparing a presentation and its defense. Students usually conduct research on the problem of project work in independent activities outside of class.

REFERENCES

1. Mirziyoyev Sh. M. Together we will build a free, democratic and prosperous state of Uzbekistan. Tashkent: "Uzbekistan", 2016. 56 p.
2.On the strategy of action for the further development of the Republic of Uzbekistan// Strategy of action for the development of the Republic of Uzbekistan in 2017–2021. Dated February 7, 2017, No. UP-4947.
3.On measures to improve the quality of education in mathematics and the development of scientific research. Resolution of the President of the Republic of Uzbekistan No. PK-4708 dated May 7, 2020
4. Driga, V. I. Development of a professional career of a modern teacher in the conditions of creative education / V. I. Driga // Standards and monitoring in education. - 2012. - No. 4. - P. 48–51
5. Dzhumaev M. Methods of teaching mathematics for primary classes. Textbook.Baez. Tashkent, 2023.320 p.
6. Davydov V.V. Psychological theory of educational activity and methods of primary education based on meaningful generalization. -Tomsk, 1992. -112 p.
7. Djumayev M. On the basic principles and essence of the implementation of the national curriculum. No. 1 – issue of the journal "Physics, Mathematics, Informatics" / Tashkent 1 – issue

2024 / 148-165 p. http://uzpfiti.uz/uz2/fizika, matematika, informatics.htm, E-mail: fizmat_jurnali@inbox.uz

8.M.I. Dzhumaev Competence- based approach to teaching mathematics to primary school students according to the requirements in the national curriculum of Uzbekistan Science and innovation. International Scientific Journal Volume 3 Issue 2 February 2024 Uif-2022: 8.2 | Issn: 2181-3337 | Scientists.Uz. ***https://doi.org/10.5281/zenodo.10694172***

9.Djumayev M.I Ta'lim Sifati - Pedagogik kompetensiyalarni shakllantirish vositasida Buxoro psixologiya va xorijiy tillar instituti ilmiy axborotnomasi" ilmiy-amaliy jurnal. buxpxti.uz 1(5)2024 163-168 http://buxpxti.uz

10. Dzhumaev M.I**.** Competence- based approach to teaching mathematics to primary school students according to the requirements in the national curriculum of Uzbekistan Science and innovation. International Scientific Journal Volume 3 Issue 2 February 2024 Uif-2022: 8.2 | Issn: 2181-3337 | Scientists.Uz. ***https://doi.org/10.5281/zenodo.10694172***

11. Dzhumauev M. About the main principles and essence of the implementation of the national curriculum. No. 1 - issue Physics, mathematics, informatics magazine/Tashkent. 2024 / 148-165 p. http://uzpfiti.uz/uz2/fizika, matematika, informatics.htm.

12. Djumaev M.I. Competency approach in teaching mathematics to elementary school students according to the requirements of the national educational program of Uzbekistan. Collection of works of the international scientific and practical conference "Digital education - the requirement of the time" dedicated to the 80th anniversary of the director of the Aksukent Multidisciplinary College, Professor Kuatbekova Karamat Perdeshovna . Shymkent "KhDU" publishing house ISBN 9965-544-22-0 2024 - 306-311.

13..Dzhumaev M.I. Some psychological and pedagogical principles of mathematical education. Professional training in the modern world. 2020;10(4):4310-4320 https://doi.org/10.20913/2618-7515-2020-4-15

14.Dzhumaev M.I. Competence- based approach to teaching mathematics to primary school students according to the requirements in the national curriculum of Uzbekistan **Science and innovation.** International Scientific Journal Volume 3 Issue 2 February 2024 Uif-2022: 8.2 | Issn: 2181-3337 | Scientists.Uz. ***https://doi.org/10.5281/zenodo.10694172***

15. Dzhumaev M.I. Development of mathematical competence among future primary school teachers in the educational process. Proceedings of the III International Scientific and Proactive Conference "Modern problems of teaching mathematics, computer science and physics in secondary and higher schools" (May 16, 2024). Generally edited by M. Nugmonov. – Dushanbe: Polygraphy TSPU named after. S.Aini, 2024. – Art.100-106

16. Dzhumaev M.I. A competency-based approach to teaching mathematics to primary school students according to the requirements in the national curriculum of Uzbekistan. ISBN 9965-544-22-0 2024 – 306-311

17. Loktionova T.E., Sergeeva M.G. Comfortable educational environment in an educational organization: a modern approach to design. Vocational Education and Society. - 2018. - No. 3(27). — 43-106 s.

18. Fridman L.M. How to learn to solve problems. Moscow: Education 2005. 132 art.

19.Peterson L.G. Modeling as a means of forming ideas about the concept of function in grades 4-6 of secondary school. dis. for the job application uch. step. Ph.D. ped. Sci. -M., 1984. -201s.